CLAIMS

WE CLAIM:

1.   A process for providing lithographic exposures utilizing a line narrowed bas discharge laser, comprising the steps of:

      A.   modeling with a computer program lithographic parameters to determine a desired laser spectrum needed to produce a desired lithographic result,

      B.   utilizing a fast responding tuning mechanism to adjust center wavelength of laser pulses in a burst of pulses to achieve an integrated spectrum for the burst of pulses approximating the desired laser spectrum.

2.   A process as in Claim 1 wherein said burst of pulses are a number of pulse within the range of about 20 to 400 pulses.

3.   A process as in Claim 1 wherein said burst of pulses are produced as a repetition rate in excess of 1000 pulses per second.

4.   A process as in Claim 3 wherein a wavelength spectrum is measured for each pulse.

5.   A process as in Claim 4 wherein wavelength measured for each pulse is used to control wavelength of one or more subsequent pulses.

6.   A process as in Claim 1 wherein said desired laser spectrum comprises two or more separate peaks.

7.   A process as in Claim 6 wherein said two or more peaks are separated by at least 0.5 picometer.

8. A process as in Claim 6 wherein said desired spectrum comprises three separate peaks.

9. A process for producing effective bandwidths of a pulse laser beam of a narrow band electric discharge laser having a line narrowing unit comprising a grating and a fast tuning mechanism, said process comprising the steps of:

    A)   monitoring said laser beam to determine bandwidth of individual pulses laser pulses,

    B)   periodically adjusting the tuning mechanism during a series of pulses so that the wavelengths of some pulses in said series of pulses are slightly longer than a target wavelength and the wavelengths of some pulses in said series of pulses are slightly shorter than the target wavelength in order to produce for the series of pulses an average spectrum centered approximately at the target wavelength with average spectral deviation from the target wavelength approximately equal to a desired deviation.

10. A process as in Claim 9 wherein said line narrowing unit comprises a piezoelectric drive unit.

11. A process as in Claim 10 wherein said line narrowing unit comprises a tuning mirror driven by said piezoelectric drive unit.

12. A process as in Claim 9 wherein the bandwidths of individual pulses are determined by determining a slit function of a spectrometer, determining a raw data spectrum, for said laser convolving the raw data spectrum with the slit function to produce a forward convolved spectrum determining width for the forward convolved spectrum W_{FC} and a width of the raw data spectrum, W_R computing an estimate of the width of the true spectrum W_T by a formula equivalent to:

$$W_T = W_R - (W_{FC} - W_R).$$